

- Recent.— 1. *a.* Alluvial deposits; river-beds and river-terraces of modern date.
b. Special deposits of pumice along the river-valleys, consisting of pumice and pumice sands.
- Pleistocene.— 2. *a.* Deposits of pumice on elevated and flat-topped areas.
b. Volcanic rocks at the source of the Rangitikei.
- Pliocene.— 3. *a.* Upper or Puketapu limestone.
b. Sandy clays and pumice sands.
c. Lower or Puhoi limestone.
d. Sands and pebble-beds, with patches of shelly limestone.
e. Coarse breccias and conglomerates.
- Triassic.— 4. *a.* Sandstone and carbonaceous shales forming the Kaweka Range.
- Carboniferous.—5. *a.* Rocks of the Kaimanawa Mountains.

Carboniferous.

5, *a.* *Rocks of the Kaimanawa Range.*—These in the district examined consist chiefly of grey indurated sandstones and dark shales and mudstones. There is little variety in these rocks. The strike is usually north-west to west, and towards the east side of the area over which they occur the dip is easterly and more towards the centre of the mountain region to the westward. The sandstones weather to a light-grey, and often could be mistaken for quartz. Even the more sandy of the shales have a tendency in this direction. With these rocks are bands of slaty breccia consisting of small pieces of slate in a sandy matrix.

The trend of the principal river-valleys is partly across the strike of these rocks, the lateral lesser valleys being more in the direction of the strike; the result is that along the main valley of the Rangitikei and that of its principal tributary, the Mangamaire, the mountain heights are an apparently confused assemblage resulting from the greater resistance of the hard sandstones to denuding agents. Originally the whole has been an elevated table-land, but the present features were mainly determined prior to the pumiceous outburst of late Pliocene or Pleistocene times.

Towards the east on the Mangamaire Range, and between the Upper Mangamaire and the Ngaruroro, traces of this table-land still remain; and both this and the range between Kaimanawa Creek and the Taruarau Valley have a linear direction in a north-north-east direction, which distinguishes this part from the area more to the westward.

During Pliocene times the country was depressed 3,000 ft. lower than at the present time, and the southern part of the area was at and below sea-level.

The mineral wealth of these rocks is not great; gold does occur in the river-gravels of the district, but clearly not in quantity sufficient to pay for working the drifts, which themselves are not of great extent. Quartz reefs carrying a percentage of gold also occur on the southern part of the Mangamaire Range, but the real value of these has yet to be determined. (For fuller particulars *re* gold, see previous section of this report under heading of "Prospecting.")

As to the age of the rocks forming the Kaimanawa Mountains, they are here considered as Carboniferous, and correspond with the like rocks in the Ruahine, Tararua, and Rimutaka Mountains. No definite proofs of the age of these rocks have yet been obtained. Indistinct plant-remains do occur, and the fossil annelid of Mount Torlesse, Canterbury, is found at Cape Terawhiti; and, as the rocks of Mount Torlesse are generally regarded as of Carboniferous age, this and the certain knowledge that they are older than Trias, and do not resemble the known Devonian rocks of New Zealand, make it highly probable that the rocks of the central part of the Kaimanawa Mountains are of Carboniferous age.

TRIASSIC.

4, *a.* *Rocks of the Kaweka Range.*—These form the eastern margin of the mountainous country, and rise abruptly from the lower country to the eastward, and which is formed of younger Tertiary rocks. The rocks of the Kaweka Range, and the continuation of the same south of the Ngaruroro River, are younger than those of the central higher part of the Kaimanawa Mountains, and are somewhat different in character, though still consisting of interbedded masses and bands of sandstones and shales, the sandstones considerably indurated. The thinner-bedded sandstones alternate with sandy shales of a light-brown colour, which are frequently crowded with obscure plant-impressions, and sometimes to such an extent that the shales might be regarded as coaly shale. The heavier beds of hard grey sandstone sometimes attain a thickness of 30 ft. or 40 ft., but are not continuous for any great distance, and as a rule are much jointed. The thinner-bedded sandstones having partings of shale between are always much contorted, and are as much jointed as the heavier-bedded rocks just described. The joints are filled with a white powdery mineral which, adhering to the surfaces, makes it appear as though the thin-bedded sandstones were quartz, and for such they have often been mistaken; otherwise it is difficult to explain the oft-reported occurrence of quartz in the Kaweka Range.

Calcite sometimes is found with these rocks, but always in thin veins and nests; and a common error of prospectors such as have explored the Kaweka and Kaimanawa Ranges is to mistake calcite as a form of quartz, but calcite as it occurs in these mountains cannot be made responsible for the reported thick reefs of quartz.

The brown sandy shales which have been mentioned as forming a part of these rocks are well displayed in the cuttings of the mountain-road that, west of Kuripapanga, crosses Gentle Annie. I spent some time endeavouring to obtain plant-impressions of a character such as might lead to an identification of the species to which they belonged, but the search was fruitless.

The Tutaekuri River takes its rise in the Kaweka Range, and the shingle-bed of that river shows here and there boulders of jasperoid quartz. These, I inferred, had been brought from the upper tributaries of the stream; but, though it is more than likely that the jasperoid rocks are